

## WORLD'S MOST ADVANCED TRANSCODER

# INERTIA<sup>TM</sup>

## TRANSCODING MULTIFORMAT SIGNAL CONVERTER with DV/SDI





# LTM-6000C

## ALL FORMAT TRANSCODER

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### Warranty Information

Laird warrants your product to be free from malfunctions and defects in both materials and workmanship for one year from the date of purchase. Please see the enclosed warranty card for full details or your local dealer or Distributor for questions concerning the warranty.

### Technical Support

Laird maintains a free user support web site to help with all of your technical support needs. Visit: <http://laird-support.com/>

### Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipments.
- Review the contents of this instruction manual.

In addition to the unit itself, the package should also contain:

- AC Adaptor 12 V, 4 Pin XLR
- 2 - Power Line Cables - USA/Euro
- Warranty Card
- This Manual

## SPECIFICATIONS

#### Video Inputs/Outputs:

DV 1394 I/O:

DV25: DV/DV CAM / DVC Pro: Via FireWire 6 Pin Port, 400 Mbits Speed

DVDistance 70foot (21meter) Cable driver with power option

Digital I/O: SMPTE259M:

Digital Video I/O: SDI: (BNC), 75 Ohm, 10-bit resolution, 270 MBit/sec, SMPTE 259M

Composite Video:

**Inputs:** 1 BNC, 1.0V p-p into 75Ω

**Outputs:** 2x BNC 1.0V p-p into 75Ω

S-Video:

**Inputs:** 1 4-Pin Mini DIN, 75Ω, Y: 1.0V p-p, C: 627mV p-p

**Outputs:** 2x 4-Pin Mini DIN, 75 Ω, Y: 1.0V p-p, C: 627mV p-p

Component:

**Inputs:** 1 Set BNC x 3, 75Ω, (Y, R-Y, B-Y), SMPTE level

**Outputs:** 2 Sets BNC x 3 75Ω, (Y, R-Y, B-Y), SMPTE level

Analog Video Standards:

NTSC (525 line / 60 Hz) or PAL (625 line / 50 Hz)

Analog Audio:

**Inputs:** 2-Channel Balanced XLR, +4 dBu nominal, 20kΩ

**Outputs:** 2X: Balanced: (XLR), +4dBu nominal into 600Ω

Analog Audio Sampling:

48 or 32 kHz at 20-bit resolution, 2-Channel

Digital Audio: AES/EBU:

XLR : 2-7 V p-p across a 110 Ohm load

Audio / Video Sync:

Audio and Video are fully synchronized, regardless of input source

Sampling Format:

DV, DVCAM: NTSC 4:1:1, PAL 4:2:0

DVCPRO: NTSC-PAL 4:1:1

DV AUDIO: Decode: 48Khz, 44.1Khz, 32Khz

Encode: 48Khz, 32Khz

Genlock:

Looping Genlock input using composite video or Blackburst 1Vp-p into 75Ω

Horizontal Phase Adjust Range: +/- 128 Pixels

SubCarrier Phase Adjust Range: 360°/256

Vertical Offset Adjust Range: 0-7 Lines

Compatibility:

DVCAM, DVCPRO, WIN98/ME/2000/XP

Machine Control:

Standard Sony Machine RS422 control protocol Bi-directional over Firewire IEEE1394 6pin

Via 9pin DB9Female, using standard RS422 9pin cables

Firmware upgrades vis RS232 serial port DB9Male

System Upgrades:

Push-Button Switches and LCD select Main Menu Functions for all operations: NEXT-DOWN-UP

Front Panel Control:

Front panel vary audio encode level with VU meter display.

Audio Level Control:

12Volt DC @ 4A provided with product via 4PIN XLR connector Pin#1 Ground, Pin#4 Hot.

Power Requirements:

2 Non-Captive UL/CE Linecords are provided with unit for 110/220 Volt AC Operation. CAUTION! Use only the power supply provided with the unit.

Certifications:

**Converter:** FCC, CE

External Power Unit:

UL, CSA

Dimensions/Weight:

3.5"H (2RU) x 11"D x 19" W: EIA Rackmount; 8.5 Lbs. Less Shipping Carton

Environmental:

**Operating Temp:** +32°F to 110degF(0°C to 43°C)

**Operating Humidity:** 10% to 85%, Non-Condensing

**Storage Temperature:** -40degF to +150degF(-40degC to +65degC)

Specifications subject to change without notice. Contact Website for current information: [www.LAIRDTELEMEDIA.COM](http://www.LAIRDTELEMEDIA.COM)



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### THE LAIRD QUALITY ASSURANCE

The LAIRD LTM-6000C is a professional broadcast quality audio-video signal converter that fulfills the high demand world of broadcast production operations. The LTM-6000C represents years of development technology pioneered by LAIRD engineers, coupled with a great deal of industry input from professionals all over the world. The result is one of the most flexible and powerful analog-digital-analog signal converters ever manufactured.

This product is designed to provide the highest level of performance and signal quality over the entire spectrum of signal conversion and digital-analog hybrid technology environment demands. Housed in a 2RU EIA rack mount enclosure, the LTM-6000C is efficient and reliable and will provide years of trouble free service. Equipped with a serial port for easy firmware upgrades whenever required, the LTM-6000C will always be up to date and compatible with developing adjacent technologies.

#### FEATURES:

The LTM-6000C is by definition a powerful multi-format decode-encode platform with digital, CAT5 and DV capabilities. The system is designed around an easy and friendly push button menu driven system with a bright LCD display. Using the LTM-6000C is easy and functional.

- Bi-directional Conversion of DV to/from Analog
- Bi-directional Conversion of DV to/from SDI
- Bi-directional Conversion of SDI to/from Analog
- Bi-directional Analog to Analog Transcoding
- Bi-directional Digital/Analog Audio Conversion
- Video I/O: Composite, S-Video, Component (YUV)
- Digital Video I/O: IEEE-1394 DV, SDI
- Analog Audio I/O: Balanced
- Digital Audio I/O: AES/EBU (48, 44.1 and 32KHz)
- Dual Analog Outputs: Composite, YC, Component & Balanced Audio
- DV Audio Encode: 48KHz and 32KHz
- DV Audio Decode: 48KHz, 44.1KHz and 32KHz
- IEEE-1394 Compatible: DV, DVCAM, DVC-PRO
- RS-422 Sony Machine Control Protocol
- CAT-5 Video / Audio Balun Transmitter: 500 Feet
- IEEE1394 Long Line (70 ft.) Powered Driver
- Genlockable for easy Systems Integration
- NTSC-PAL Selectable
- AVID Certified

#### TECHNICAL SUPPORT

*For current support issues and answers to common questions,  
please visit the Laird support website at:*

**<http://www.laird-support.com>**

**or call: 800-898-0759**

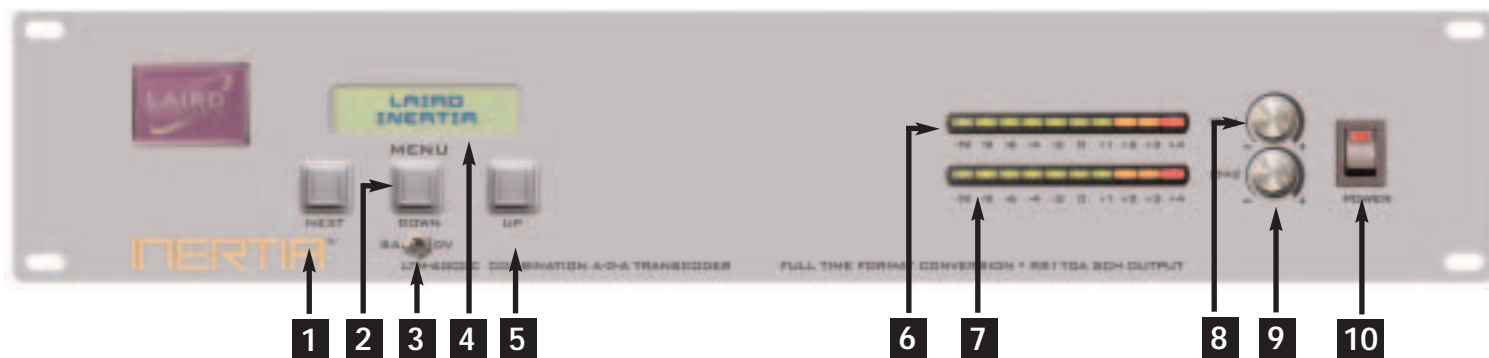


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### FRONT PANEL FEATURES

You will notice that for such a powerful device, the front panel incorporates an efficient and uncluttered design. The LTM-6000C also features a powerful menu operating system. The use of high-speed digital logic and dedicated audio-video semiconductor technology allows the fast configuration of setups and equipment integration, which performs well in broadcast facilities. The audio and video signals are all buffered in and out to provide proper line drive and cable coupling. High quality A/V connectors are used for all input and output hardware connections.



1.) Menu Next Button

2.) Menu Down Button

3.) Standalone - DV Switch

4.) LCD Menu Display

5.) Menu Up Button

6.) Channel 1 LED Level Meter Bar

7.) Channel 2 LED Level Meter Bar

8.) Channel 1 Level Adjustment (ENCODE)

9.) Channel 2 Level Adjustment (ENCODE)

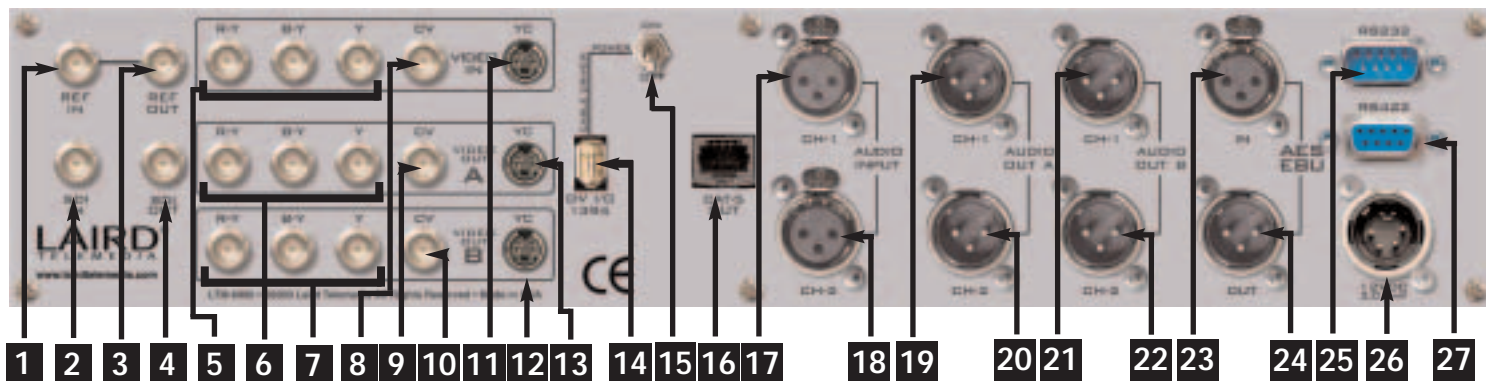
10.) Power On/Off Switch



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### Rear View Features



- |                                  |   |
|----------------------------------|---|
| 1) Reference Signal Input        | 15) FireWire Cable Driver Power On/Off    |
| 2) SDI Signal Input              | Set to On when using LTM-FDR cable driver |
| 3) Reference Signal Output       | 16) Cat-5 Output                          |
| 4) SDI Signal Output             | (used with LTM-CTRV Cat5 receiver)        |
| 5) Component Video Input         | 17) Balanced Audio Input (Ch1)            |
| 6) Component Video Output (ChA)  | 18) Balanced Audio Input (Ch2)            |
| 7) Component Video Output (ChB)  | 19) Balanced Audio Output (Ch1-A)         |
| 8) Composite Video Input         | 20) Balanced Audio Output (Ch2-A)         |
| 9) Composite Video Output (ChA)  | 21) Balanced Audio Output (Ch1-B)         |
| 10) Composite Video Output (ChB) | 22) Balanced Audio Output (Ch2-B)         |
| 11) YC Video Input               | 23) AES/EBU Input                         |
| 12) YC Video Output (ChB)        | 24) AES/EBU Output                        |
| 13) YC Video Output (ChA)        | 25) RS232 Remote Control & Upgrade Port   |
| 14) IEEE1394 DV Firewire I/O     | 26) 12V DC Power Input                    |
|                                  | 27) RS422 Machine Control                 |

#### POWER UP PROCEDURES:

To familiarize yourself with the menu functions it is advisable that you simply plug in the power supply and power up the unit without any devices connected. The LCD display will illuminate and then cycle through its internal diagnostic functions. After this is complete the factory default mode setting of DV DECODE will be displayed on the LCD.

By pressing the NEXT button, you will begin the function select operations. The LCD will display each function as you advance through the menu. Study the menu tree on the next page to familiarize yourself with the LTM-6000C functions. There are a few functions that merit special attention: PAL and NTSC does have some special selections that are unique to each other. This is outlined in the menu tree. In GENLOCK ON, there are selections for three related operations: Horizontal Phase, Subcarrier and Vertical Offset.





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### FAMILIARIZING YOURSELF WITH THE LAIRD LTM-6000C

The LAIRD LTM-6000C represents the finest in multi-format signal transcoding and conversion. Designed to fit seamlessly into any professional broadcast or post production media facility, the LTM-6000C will provide high quality performance and operations for years to come.

The product is designed as an integrated system to handle the demanding media environment where a variety of signal conversion and transcoding requirements exist. The LTM-6000C also provides a bridge between analog and digital equipment to create a hybrid solution to the fast moving evolution of signals from analog to digital.

The simple block diagram below is but a very basic representation of the technology operations that the LTM-6000c can perform. The unit is built around the latest powerful IEEE1394 DV CODEC. The major function of the LTM-6000C is to provide the easy bi-directional conversion of analog to DV(1394). The LTM-6000C is the final result of many years of research and provides flexible solutions to this signal bridge and beyond.

The LTM-6000C can also provide basic signal transcoding conversion between any of the standard analog and digital formats signals. Thus, as a stand-alone unit it can serve as a signal format transcoder and provide a very wide variety of daily operations.

Software is the key to the smooth integration of the LTM-6000C. The LTM-6000C is self-diagnosing and will perform a complete system check every time you power up the unit. The Operating System provides seamless navigation through the very flexible settings and then goes one step further to use adaptive firmware to work with all computers and NLEs. Settings are available for Windows98, 2000 and XP. The LTM-6000c can also be configured to connect directly to any DV VTR or Camcorder. Firmware allows the unit to perfectly match any DV device so that a “no compromise” operation is provided.

Carefully read and study this operations manual. It will guide you through the many features and performance settings of the LTM-6000C.





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### Cables and Wiring Guidelines

It is strongly recommended that you use only quality analog and digital cables for your connections to the LTM-6000C. The SDI on the LTM-6000C is standard SMPTE 259M-C and should be connected to digital coax for any distance over 6 feet. Use high quality true 75Ω BNC connectors and try to avoid using adapters of any kind.

The AES/EBU is provided via a XLR connector and is a transformer coupled 110Ω driver. To adapt this to a BNC AES/EBU you must use a 110-75Ω adapter such as the Connectronics AES/EBU1 or AES/EBU2. It is important to properly match the impedance of your signals.

Component (YUV) video signals should be wired with high-grade RG-59U shield cable using high-grade BNC connectors. Be certain to use exact equal lengths for R-Y (V), B-Y (U) and Y signals. It would be advisable to use color-coded cables for easy identification during cabling.

The LTM-6000C can be used as a desktop device or in a EIA Rack mounted system. The only limitation is that the front panel LCD display must be viewed for certain setup functions. For applications where the unit must be rack mounted away from operators RS232 Remote Control Software that runs in Windows can be used. The software also has signal processing functions that are only available with this software package. The RS-232 remote software does have some operational limitations that will be covered in a later paragraph. The control software is available from the LAIRD TELEMEDIA website: [www.lairdtelemedia.com](http://www.lairdtelemedia.com).

### Power Options

The LTM-6000C was designed to be powered by a high-grade in-line switching power supply with a regulated output of 12Volts DC@ 4APMS Maximum. The unit may be powered by any such quality power supply or 12 Volt Battery. The power entry is a standard 4pin XLR Male with pin#1 GROUND and Pin#4 POSITIVE (HOT). Using any other source of power is not recommend, as it may damage the unit or cause it to not power-up properly.

### Environmental Conditions

A cool ventilated operating environment must be provided for the LTM-6000C. It is advised that the unit not be sandwiched between two heat-generating pieces of equipment. It would be wise to allow a 1RU space above and below the unit. **Do not** place the LTM-6000C directly above a VTR. Some VTRs emit a high level of RF from the head amplifier and this can be picked up by the LTM-6000c and cause interference. It is advisable that the unit be at least 4RU away from any such device. High level of RF in the environment such as certain medical or radio towers can cause interference. It is recommended that in such environments proper shielding be provided for the unit.

Extreme heat and cold can cause the unit to malfunction. Be certain that the unit is not exposed to harsh temperature changes outside the specifications listed in this manual.

Dirt and ash can cause damage to any piece of precision equipment. Keep the unit in a clean, moisture and smoke free location. Follow the hazard warnings provided at the end of this manual.

### Power-Up Procedures

It is recommended that you have all devices properly wired before any power up is performed. Based on the nature of DV and DV devices, the proper sequence must be followed: Power-up the LTM-6000C first and make sure it settles in its default mode: DV DECODE. Setup the LTM-6000C for the operation you require and then power up the other DV device. Computer based DV devices such as Non-Linear Editors(NLEs) have to "see" a live DV DEVICE in order to properly initialize the software. The LTM-6000C will be identified as a PHILLIPS DEVICE depending on your operating system and software. **DO NOT HOT CONNECT IEEE1394** (FireWire) devices. This can cause damage to your device and the LTM-6000C. Be certain that the device is turned off before inserting or removing connections. In the case of PCs it is advisable that the operating software such as edit software be offline or exited before any connections are made.







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### Using The LTM-6000C with Avid Xpress DV 3.5.4

**Note:** Please be aware that this list has been compiled based on lab testing and user Feedback. It is not a document created by AVID or any official channel related to AVID TECHNOLOGIES.

1. Before starting the AVID application, the LTM-6000C SDI should be set to its working settings, like Encode/Decode Mode or DVCam/DVCPRO-25.
2. Switching the LTM-6000C On and Off while the AVID XPress DV application is running should be avoided. This can corrupt the driver.
3. **Do Not** switch between DVCam and DVCPRO in Pal while the Xpress DV application is open.
4. Digital Cut: AVID XPress DV does not allow mixed clips coming from DVCam or DVCPRO in one project, it comes up with an error message.
5. When controlling the VCR through RS-422 directly from AVID via a serial cable connected to the PC/MAC, the Firewire Control in the Deck Configuration MUST be disabled (deleting the Deck on the Firewire OHCI channel). The Conversion direction must be set manually directly at the converter. This must also be done, when using no deck control. Failure to do this will result in AVID changing the DECODE and ENCODE mode on the LTM-6000C.
6. During digital cut or previewing clips in the bin, the record Window must be closed. Otherwise AVID XPress DV tries to switch the device on the firewire port that is not available, this causes a delay from up to 5 seconds before the playback starts.
7. The desktop play delay should be set to 13-15 frames for Pal, depending on the speed of the computer.
8. Be certain to check in the Audio Tools of AVID XPress DV the direction of the Audio channels. During Record they must be an input and during Preview or Digital Cut they must be an output.

### Using The LTM-6000C with WINDOWS

Your DV equipment such as a PC may be equipped with an OHCI compatible FireWire card. Assuming all connections are proper, the PC will recognize the LTM-6000C as new hardware as soon as it is initialized. The LTM-6000C will be listed as a Phillips Device. Make certain that you have entered the proper Windows system compatibility selection from your Menu for Windows 98, ME, 2000 and XP.

To verify that your LTM-6000C is operating as a basic DV conversion device you can connect a video and audio analog signal to the LTM-6000C and follow the setup for DV ENCODE: Converting Analog to DV. from your Windows 2000 or XP desktop, double click on MY COMPUTER. The window will open and you should see the LTM-6000C as a "Phillips DV Device or Camcorder". This verifies that the LTM-6000C and the OHCI FireWire card are working properly and Windows is recognizing the connection properly. This does not mean that your software will automatically work. Some software requires that certain "templates" be loaded before the DV device is online. Study your software manual and follow any instructions provided for such operations.

### Using The LTM-6000C with Apple/Macintosh

For Apple Mac based systems the LTM-6000C will be recognized as a DV DECK or VTR.



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### DV DECKS AND CAMCORDERS

To interface with standard DV(IEEE1394)(FireWire) decks such as SONY DSR series, Panasonic DVCPRO and any other such device, simply select the proper DV MODE OS in the menu setups. Select DV DECK for interface requirements between analog equipment & DV VTRs.

### OTHER DV TRANSCODERS

If there is a need to interface the LTM-6000C with another DV transcoding device, always choose the DV DECK mode for this operation. The LTM-6000C was tested with several of the most popular DV transcoders for seamless operation. If you should encounter a device that does not interface properly, please contact customer service and report the problem and we will try our best to help.

### STUDIO AND FACILITY INTEGRATION

For system integration into larger facilities, it may be required to GENLOCK the LTM-6000C to provide system phasing to HOUSE REFERENCE. The LTM-6000C can be GENLOCKED to standard CVBS video BLACKBURST. Once this feature has been activated, the LTM-6000C can be horizontally and Subcarrier timed for perfect house lock. There is an additional provision for vertical offset compensation which is a typical problem found in digital processing equipment.

### DV SYSTEMS

The LTM-6000C is a industry standard IEEE1394 system which operates in DV/DVCAM for NTSC and DVCPRO25 for PAL.

### RS422 MACHINE CONTROL

A 9-Pin D-Sub machine control port is provided for NLE machine control via FireWire (IEEE1394). This system will provide standard SONY RS422 control protocol without the need for any external equipment. This control system is a pass-through protocol and simply passes the NLE commands that are on the FireWire port and converts them to RS422 serial. The standard list of RS422 commands which are translated are listed below:

STOP  
PLAY  
PAUSE  
REVIEW

SLOW FORWARD(.2X)  
SLOW BACKWARD(.2X)  
FAST FORWARD(10X)  
FAST REWIND(10X)

CUE  
STEP FORWARD  
STEP BACKWARD  
RECORD(EDIT)  
RECORD PAUSE

### TIME CODE

The LTM-6000C will read and decode the time code stream from the RS422 data. Both LTC and VITC time code can be read, as well as, interpolated between both formats. An asterisk will display on the lower right corner of the LCD panel that confirms that Time Code is being read and processed.

### RS232 COMMANDS

A 9pin A-Sub port is provided for two functions. The first is the provision for system upgrades and firmware debugging. The LTM-6000C is designed with the very latest in on-board programmable software technology that allows updates, changes and re-programming via the RS232 port without ever having to open the device. This gives the product high field reliability and serviceability by reducing the need to return the unit to the manufacturer for compatibility upgrades and improvements.

The RS232 port is also used to remotely control the LTM-6000C and provide signal processing(PROC-AMP) features. The RS232 port uses standard 9pin computer serial cables and can be operated up to 100 feet with proper shielded serial cable. The control software runs in Windows and can be downloaded free of charge from the LAIRD website.

### STAND-ALONE SIGNAL TRANSCODING OPERATIONS

The LTM-6000C is designed around a highly advanced signal-processing block of technology. Utilizing the latest in firmware-based semi-conductors, the LTM-6000C is built to perform as a stand-alone signal processor for analog and digital signals. There is no need to connect a DV signal or device to convert between SDI/AES and analog. The product is designed to output all formats once a particular format has been selected as the input signal to be converted. We refer to this as FULL-TIME CONVERSION. For example: if you choose to convert SDI and AES/EBU signals to component, then the LTM-6000C will also output Composite, YC, and Balanced Audio as well. A switch is located directly below and center of the LCD display. In the DV position the LTM-6000C will provide IEEE1394 (FireWire) bidirectional conversion in addition to all digital and analog formats. In the SA position, the product will ignore any DV signals connected and simply work as a Stand-Alone format signal converter. When using this feature it is recommended that you power down and up between function changes using the switch.



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### Menu Navigation

Now that you are familiar with all the features and operational scenarios that are possible with the LTM-6000C, it is time to study and learn to navigate the MENU. Power-up your product and first study and use the menu to get familiar with its operation. It not required that you connect any equipment to the product in order to practice the menus.

### The Menu Buttons

The three buttons located directly below the LCD menu display are labeled as follows:

- NEXT** This is the main “cruising” button for the menu operation. Pressing this button advances the menu selection to the next feature. This button will always advance the menu, it does not go backwards.
- DOWN and UP** Each menu area arrived at by the NEXT button has several selections. The DOWN button works in conjunction with the UP button. These allow you to toggle between the various menu options. Some selections are simply toggle ON-OFF of selections, while some are numerical such as audio level and Genlock timing settings. The menu buttons cycle back to the beginning of each selection branch. If you miss a selection or made the wrong selection, simply NEXT to the feature and enter the correct selection.

This manual provides a MENU graphic which shows in detail the entire menu entries and selections. It has been designed to make it easy to understand the flexibility of the LTM-6000C. Study this graphic with the unit powered up and try the functions. You will soon see how easy it is to use LTM-6000C.

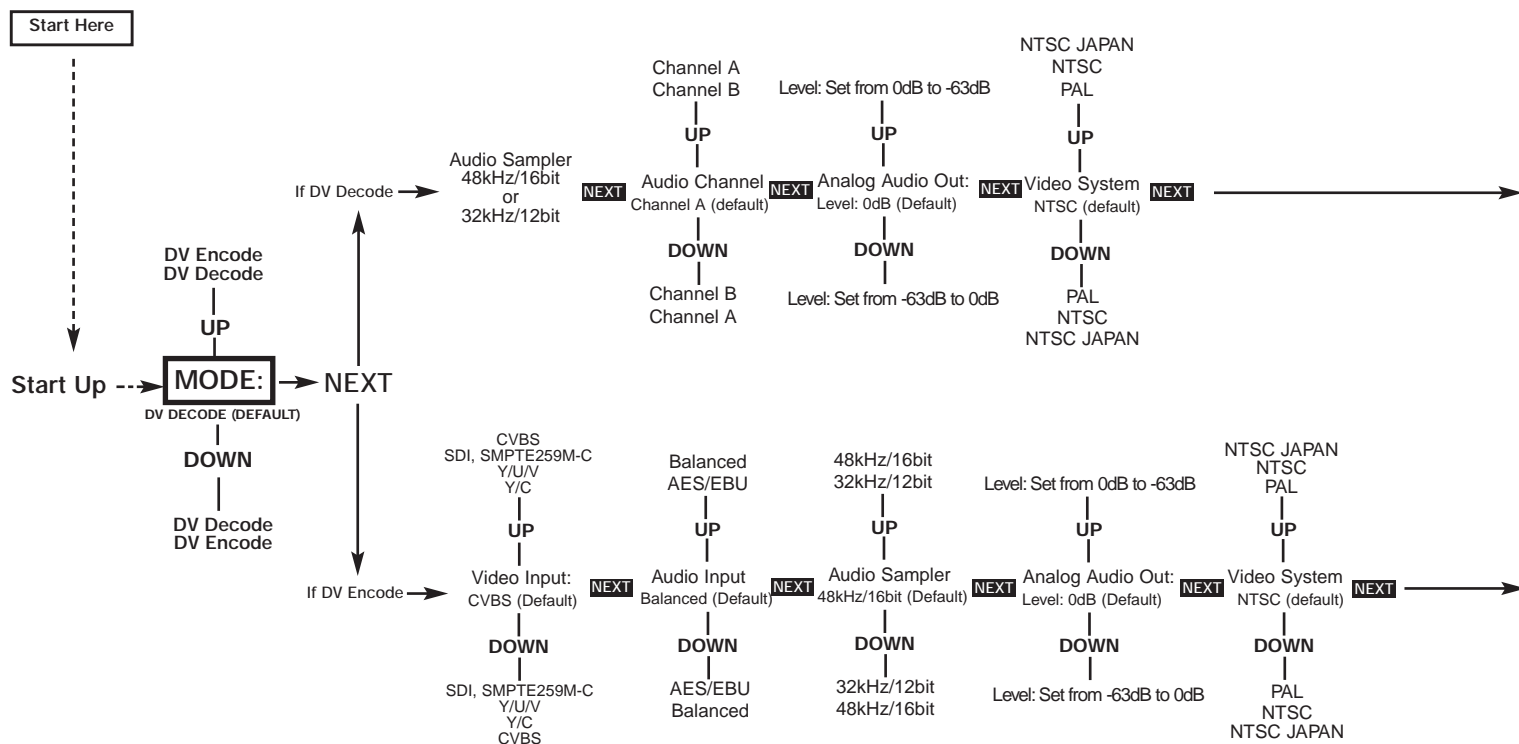




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### LTM-6000C Menu Operations



**DV Encode: Encoding an Analog Input to a Digital Format for Output, i.e.: Encoding Analog Component Video (YUV) to DV.**

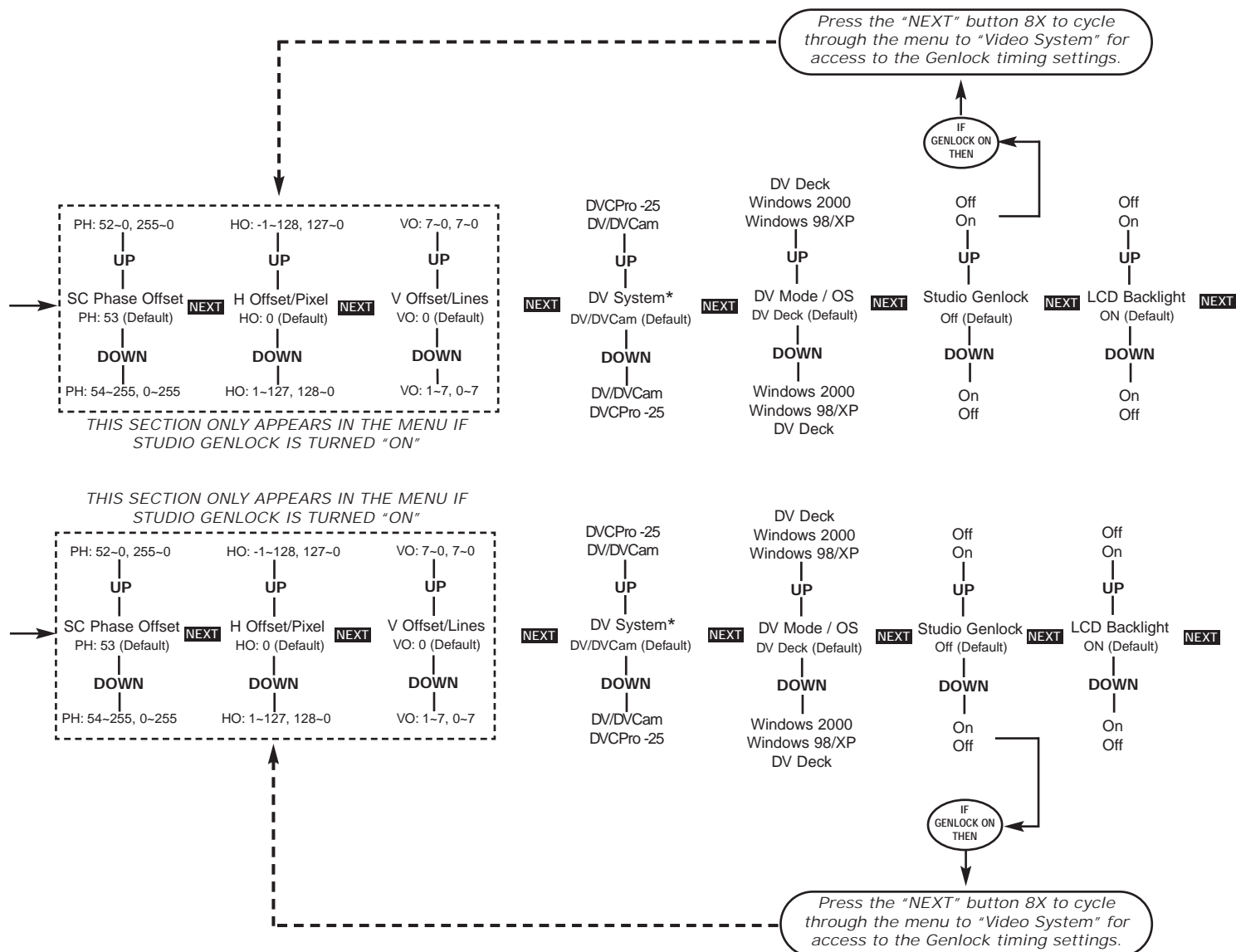
**DV Decode: Decoding from a Digital Input to an Analog Format for Output, ie: From DV to Analog Composite Video (CVBS).**





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\*Can be selected only in PAL mode

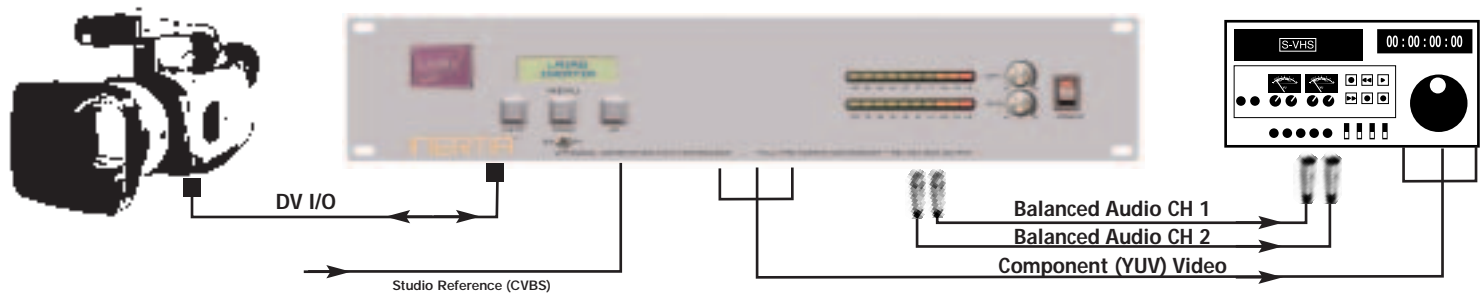


# LTM-6000C

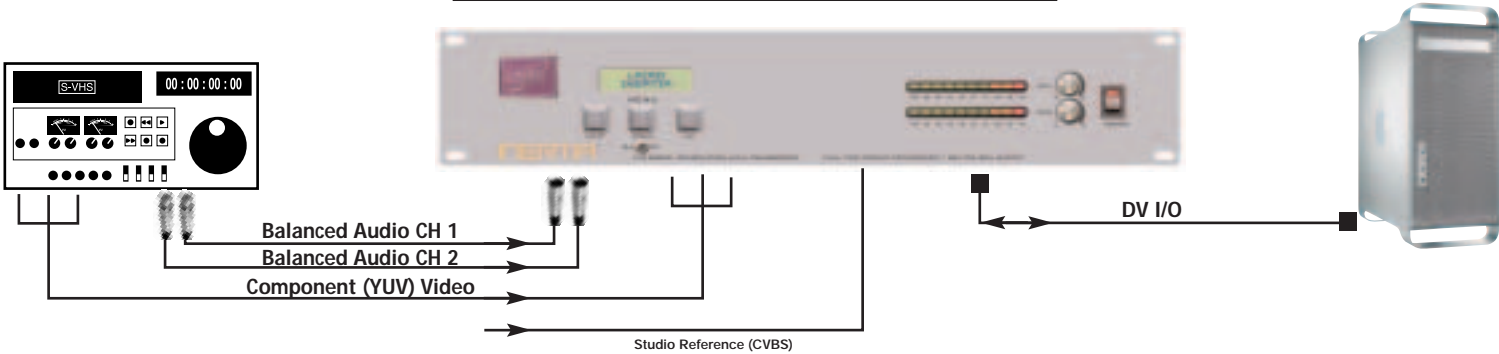
## ALL FORMAT TRANSCODER

### SYSTEM APPLICATION DRAWINGS

#### DV To ANALOG CONNECTIONS



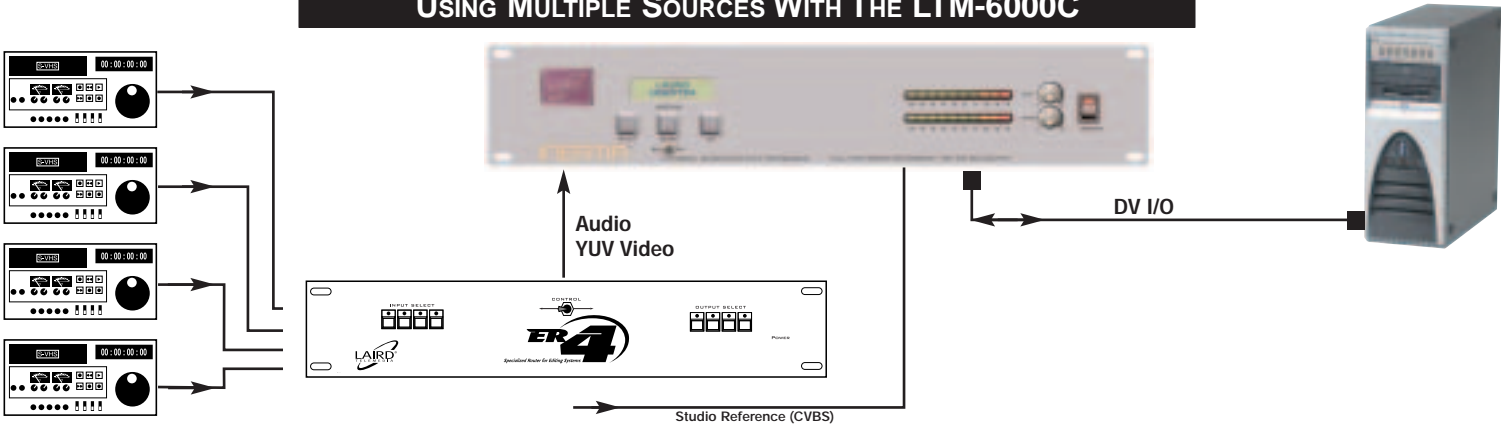
#### ANALOG To DV CONNECTIONS



#### USING THE LTM-6000C WITH OTHER ROUTING EQUIPMENT

The LTM-6000C provides a professional interface for the demanding multimedia environment of modern telecommunications facilities. Indicated below are a few application diagrams, which display the flexible and cost effective use of the LTM-6000C with other LTM products.

#### USING MULTIPLE SOURCES WITH THE LTM-6000C





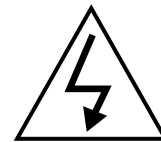


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## Safety Precautions



1. To prevent fire or shock hazard, do not expose this equipment to the environment of Humidity and/or dust. Do not use this equipment in an unprotected outdoor installation or any area classified as a wet area.
2. The operating temperature of this product must be kept between -40°C and +95°C. Direct sunlight or an intense source of heat, direct or ambient, must not be introduced to the product either by induction or contact.
3. Always keep the product on a stable and secure base or enclosure. Do not drop the product or subject it to sudden heavy impact.
4. Provide adequate ventilation so that thermal characteristics do not cause an increase in product temperature to resulting in overheating.
5. Do not clean the unit by using electrically conductive or corrosive chemicals. Always be certain to unplug the unit from AC wall power before any major cleaning. Use a damp cloth only for cleaning.
6. Do not subject the product to electrical mains power over voltage: The product must be used at the rated supply voltages indicated on the product rear panel only.
7. Do not plug the product into an overloaded electrical outlet. This may result in fire or electrical shock.
8. Object Ingress and Liquid Entry: Never insert or push sharp metal objects into the product or use such devices for an attempt at opening or servicing the product. Servicing should be referred to a trained and qualified technician only. Do not allow liquid of any type to enter the unit. Do not allow the unit to be submersed in water as this may cause a shock hazard.
9. A trained qualified technician should perform all servicing of the unit. There are no serviceable components within the unit for user access.



All Laird Products are Manufactured in the USA by Laird Telemedia, Mount Marion, NY

FireWire, Apple and G4 are registered Trademarks of Apple Computer, Inc.



*2000 Sterling Road • Box 720  
Mount Marion, NY 12456*

*800-898-0759 • 845-339-9555  
Fax: 845-339-0231*

*[www.lairdtelemedia.com](http://www.lairdtelemedia.com)*